Appendix A

Listing of Claims

Status of all pending claims (1~10)

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1. (previously presented) A computer-controlled reaction apparatus for simultaneously conducting chemical reactions on a plurality of samples by maintaining the samples in chemical isolation from each other and subjecting each of the samples to substantially identical conditions, comprising:

(a) a generally cylindrical reactor housing having a bore and a central axis, the housing comprised of:

i) a loading/unloading section having an airlock;

ii) a reaction section;

iii) an analytical monitoring system;

iv) a drive section;

v) a distribution manifold system;

(b) a gas-distribution and pressure control system in communication with the reactor housing;

(c) a positioning system connected to the drive section;

(d) a temperature control system for controlling the temperature of the reactor housing;

(e) a reaction assembly, contained within the reactor housing, and movable in the housing bore in a direction along the axis of the housing, the reaction assembly comprising:

i) a cylindrical outer body having a bore, a plurality of ports and a fluid distribution manifold;

ii) a cylindrical inner body contained within the bore of the outer body and having:

A) a bore and a plurality of ports, and

B) a sample holder containing a plurality of sample holding positions for containing the samples to be reacted,

the sample holder being receivable within the bore of inner body and movable along the axis to a fully-inserted position, wherein, when the sample holder is in the fully-inserted position within the inner body, each of the plurality of reaction wells is aligned with each of the plurality of ports of the inner body;

(f) an analytical monitoring system comprising:

at least one optical port and at least one optical arrangement, comprising a paired source and detector, the at least one optical arrangement being capable of performing a measurement, at one or more ultraviolet, visible

or infrared wavelengths, of a sample contained at a sample holding position to characterize the sample;

(g) a computer controller, connected to the gas-distribution and pressure control system, the positioning system, the temperature control system, and the analytical monitoring system;

wherein the reaction assembly is movable between the loading/unloading section, the reaction section, and the analytical monitoring system; and

wherein the drive section mechanically links the reaction assembly to the positioning system, so that the reaction assembly is positioned to each of a plurality of predetermined monitoring positions, such that at least one of the reaction wells is aligned with the at least one analytical port at each of the plurality of monitoring positions.

2. (original) The apparatus of claim 1 wherein the computer controller comprises a central processor, connected by a data bus to a random access memory (RAM), a data storage device, an interface subsystem and a display device, the central processor being controlled by an operating system and application software stored in the data storage device, the central processor controlling the interface subsystem which is connected to, and controls, the gas-distribution and pressure control

system, the positioning system, the temperature control system, and the optical monitoring system.

3. (original) The apparatus of claim 1 wherein the gas-distribution and pressure control system comprises a supply of one or more gases, one or more valves and associated flow measuring devices and pressure regulators for controlling the flow of gas to the reaction assembly.

4. (original) The apparatus of claim 1, wherein the temperature control system comprises one or more heating elements, one or more temperature sensors and a control unit, the control unit being electrically connected to the interface subsystem of the computer controller for receiving a temperature control signal and being connected to the one of more sensors for receiving temperature signals and being connected to the one of more heating elements for controlling electrical current to said heating elements.

5. (original) The apparatus of claim 1 wherein the optical ports of the optical monitoring system are positioned in a coplanar arrangement so that an optical arrangement, comprising one or more ports, a optical source and an optical detector may be selected from a plurality of optical arrangements for characterizing each sample.

6. (original) The apparatus of claim 1 wherein the optical monitoring system comprises a spectrophotometer.

7. (previously presented) The apparatus of claim 1 wherein the optical arrangement comprises a transmission arrangement, wherein light is transmitted through thin film samples.

8. (previously presented) The apparatus of claim 1 wherein the optical arrangement comprises a reflection arrangement, wherein light is reflected from at least one surface of thin film samples.

9. (previously presented) The apparatus of claim 1 wherein the optical arrangement comprises an attenuated total reflection arrangement, wherein light is repeatedly reflected from a surface of thin film samples.

10. (previously presented) A method of performing a plurality of chemical reactions using the apparatus of Claim 1, comprising the steps of:

(a) positioning the reaction assembly at an initial undocked position in the loading/unloading section, loading the sample holder with samples to be reacted and inserting the sample holder into the inner body of the reaction assembly and closing the airlock,

(b) moving the inner body of the reactor assembly to a docked position within the outer body,

(c) causing the temperature control system to bring the reactor assembly to a predetermined temperature,

(d) causing the fluid distribution and pressure control system to introduce one or more reactant fluids at a predetermined flow rate and pressure to the samples within the sample holding positions,

(e) maintaining the fluid flow and pressure for a predetermined time so that a reaction occurs between the reactant fluids and the samples,

(f) sequentially positioning the reaction assembly so that each of the sample positions is aligned at each of the plurality of monitoring positions,

(g) performing at least one optical measurement to characterize each sample,

(h) returning the reaction assembly to the initial position in the loading/unloading section,

(i) quenching the reaction by stopping the flow of reactant fluids and initiating a flow of quenching gas to return the temperature and pressure of the reaction assembly to ambient,

(j) moving the inner body of the reactor assembly to the undocked position, and

(k) opening the airlock and removing the sample holder from the reactor assembly.

11 - 88. (cancelled).